

REMARKS

In the Action, the claims are rejected. In response, claim 1 is amended, and new claim 13 is added.

Claim 1 is amended to recite the water-absorbent resin particles are obtained from an ethylenically unsaturated monomer including acrylic acid and/or its salt in an amount of 50 to 100 mol % as disclosed on page 9, lines 19-22 of the specification. New claim 13 depends from independent claim 6 and corresponds to the amendment to claim 1. Accordingly, the amendments to the claims are supported by the specification as filed.

In view of these amendments and the following comments, reconsideration and allowance are requested.

Rejection over JP 2000-63527

Claims 6-8 and 10-12 are rejected under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative under 35 U.S.C. § 103(a) as being obvious over JP 2000-63527 to Yorimichi. JP ‘527 is cited as allegedly disclosing each of the claimed features of the present invention.

JP ‘527 does not disclose or suggest the claimed step of subjecting the water-absorbent resin particles that have been dried and pulverized to treatment to enhance liquid permeability as recited in claim 6. The Advisory Action refers to paragraphs 0026 and 0052 of JP ‘527. These paragraphs do not suggest to one skilled in the art a pulverized hydrogel or treating to enhance liquid permeability as in claim 6. Furthermore, the Action does not address this claim limitation and does not identify where JP ‘527 discloses or reasonably suggests to one of ordinary skill in the art the step of subjecting the dried and pulverized water-absorbent resin particles to a treatment to enhance liquid permeability. Anticipation requires that each and every feature of the claim be disclosed either expressly or inherently in

the cited patent. JP ‘527 does not disclose this step so that claim 6 is not anticipated. The Action provides no support for the position that JP’527 inherently discloses the step. JP ‘527 provides no motivation to one skilled in the art to dry and pulverize water-absorbent resin particles followed by treatment to enhance permeability and provides no reasonable expectation of improving the properties by the process of the present invention.

JP ‘527 also does not suggest polymerizing and internally crosslinking the monomer to obtain the hydrogel, extruding the hydrogel to obtain pulverized gel particles, drying the particles and treating the water-absorbent resin particles to enhance liquid permeability as in the claimed invention. Accordingly, claim 6 is not obvious over JP ‘527.

JP ‘527 is relevant to the extent that a hydrogel polymer is formed by extruding through a screw-type extrusion apparatus having a perforated plate. JP ‘527 does not disclose an internally crosslinked hydrogel which is then extruded from the perforated structure having perforation diameters in the range of 0.3 to 6.4 mm to produce pulverized hydrogel particles.

The Action refers to paragraph 0052 of JP ‘527 as allegedly disclosing the claimed perforation diameters. This passage appears to refer to the thickness of the perforated plate rather than the dimensions of the perforations of the plate. JP ‘527 specifically refers to a perforated plate having holes in the range of 6.5 mm to 18 mm which is outside the claimed range of 0.3 to 6.4 mm. JP ‘527 is specifically intended to producing large particle sizes. As disclosed in paragraph 0054, the holes in the perforated plate being smaller than the disclosed range require a large amount of power and result in the hydrous gel being “scoured”, thereby reducing the physical properties and productivity. Thus, JP ‘527 does not disclose extruding the hydrogel through a perforated plate having openings within the claimed range.

Moreover, JP ‘527 suggests that the openings in the perforated plate within the claimed range are undesirable and result in undesirable properties of the resulting particles.

One skilled in the art would not be motivated to modify the openings of the perforated plate of JP ‘527 in view of the teachings of the disadvantages of the smaller openings in the perforated plate.

JP ‘527 also does not disclose producing at least a portion of the pulverized gel particles obtained by extruding the hydrogel through the perforated structure to obtain agglomerates as in claim 7. The Action refers to paragraph 0046 of JP ‘527. This passage refers only to the screw type extrusion machine provided with a “reversion prevention” member to prevent the sharp edges of the resulting particles and to prevent scouring. There is no suggestion in this passage of agglomerating the hydrogel particles as the term is understood by one of ordinary skill in the art. Accordingly, claim 7 is not anticipated by or obvious over JP ‘527.

JP ‘527 also does not inherently disclose surface-crosslinking the resulting water-absorbent resin particles as in claim 8. The Advisory Action contends that crosslinking “usually” involves surface treatment. This does not establish that JP ‘527 inherently surface crosslinks the particles and does not establish anticipation. The Action refers to paragraph 0057 of JP ‘527 to allegedly support the position that the particles are surface-crosslinked. This passage refers only to the extruder and the perforated plate. There is no disclosure or suggestion in this passage of surface-crosslinking the particles obtained according to JP ‘527.

Moreover, the Action fails to establish that the extrusion process of JP ‘527 inherently surface crosslinks the resulting particles as they exit the extruder or that a subsequent surface-crosslinking step is performed. Claim 8 recites the step of surface-crosslinking the resulting water-absorbent resin particles obtained from the extrusion and pulverizing step. JP ‘527 does not disclose this step so that claim 8 is not anticipated. One of ordinary skill in the art would not be motivated to carry out a surface-crosslinking step based on the disclosure of JP ‘527. Furthermore, the Action provides no rational basis for the position that it would have

been obvious to surface-crosslink the extruded product of JP'527. Accordingly, claim 8 is not obvious over JP '527.

JP '527 also does not disclose either expressly or inherently adding a liquid-permeability-enhancing agent as in claim 10, or adding a liquid-permeability-enhancing agent selected from the group consisting of polyvalent metal compounds, polycationic compounds, and inorganic fine particles as in claim 11. JP'527 does not suggest the monomer concentration of claim 12. Thus, these claims are not anticipated. Furthermore, JP '527 provides no suggestion and provides no motivation to one of ordinary skill in the art to provide the permeability enhancing agent as recited in claims 10 and 11. Thus, claims 10 and 11 are not obvious over JP '527.

As noted above, JP '527 does not suggest treating water-absorbent resin particles with a liquid-permeability-enhancing agent. The present invention is directed to an aqueous-liquid-absorbing agent that is capable of replacing the fibrous component of a conventional absorbent article. The aqueous-liquid-absorbing agent of the invention is suitable for use in a diffusing layer of a diaper or other absorbent structure to eliminate the use of a fibrous diffusing layer as in conventional absorbent structures. The diffusing layers of conventional absorbent structures typically include pulp or other fibrous material to provide the desired absorbent properties. The aqueous-liquid-absorbing agent of the invention is able to replace the conventional pulp to provide absorbent structures with reduced thickness while maintaining the desired diffusing properties. The polymer particles obtained according to the process of JP'527 are not able to satisfy these requirements.

In view of the deficiencies of JP '527, claims 6-8 and 10-12 are not anticipated by or obvious over JP '527.

Rejection Over U.S. Patent Publication No. 2002/0165288

Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent Publication No. 2002/0165288 to Frenz et al. Frenz et al. is cited for disclosing a water-absorbent composition having a saline flow conductivity and an absorption rate.

As noted in the Action, Frenz et al. does not disclose or suggest the claimed water absorption capacity. The Action appears to suggest that the water absorption capacity of Frenz et al. is “sufficiently close” to render claim 1 obvious. Frenz et al. specifically discloses the water absorption capacity of “at least 24 g/g” and thus clearly suggests that the higher absorption capacity is desirable. In contrast, claim 1 expressly recites the water absorption capacity of 10 to 20 g/g which is below the lower limit of at least 24 g/g disclosed by Frenz et al. Claim 1 recites the range of the water absorption capacity outside the range and below the minimum required by Frenz et al.

The range of the water absorption capacity of 24 g/g and above is not sufficiently close to the claimed range of 10 to 20 g/g to render claim 1 obvious to one of ordinary skill in the art. Based on the disclosure of Frenz et al., one of ordinary skill in the art would not be motivated to lower the water absorption capacity below the minimum required by Frenz et al.

The water absorption capacity (CRC) of the present invention is not a random or arbitrary value. Instead, the water absorption capacity is selected based on experimentation of the desired properties and to maintain the liquid permeability within a suitable range. As disclosed on page 26, lines 7-13 of the present specification, the liquid permeability deteriorates when the water absorption capacity is greater than 25 g/g. This discovery is unexpected from the disclosure of Frenz et al. One skilled in the art would not have a reasonable expectation of success of providing the desirable liquid permeability by maintaining the water absorption capacity within the claimed range.

The desirable properties of the aqueous-liquid-absorbing agent of the claimed invention are based on the combination of the four properties of claim 1. Each of the claimed properties together provide the desired characteristics of the aqueous-liquid-absorbing agent of claim 1 such that an absence of any one of the properties alters the resulting product. In particular, Applicants found that the desirable property and effects of the claimed aqueous-liquid-absorbing agent are attained by providing an absorption rate (FSR) of not less than 0.2 g/g/s, a water absorption capacity (CRC) of 5 to 25 g/g, a saline flow conductivity (SFC) of not less than 400×10^{-7} cm³·s/g, and a wet porosity of not less than 20 %. Frenz et al. provides no suggestion of the combination of each of the claimed properties. One skilled in the art would have no reasonable expectation that the combination of the four properties of claim 1 would provide the desired properties based on the disclosure of Frenz et al.

As discussed above, the aqueous-liquid-absorbing agent of the present invention has an absorption performance that is capable of replacing the fibrous component of conventional absorbent structures without reducing the diffusing properties. The aqueous-liquid-absorbing agent is used for the diffusion layers instead of being used as water-absorbent resin cores of the conventional water-absorbent resins. The absorbent structures of the present invention can be made thinner by replacing the fibrous materials of the diffusion layers with the aqueous-liquid-absorbing agent of the present invention.

The properties of the aqueous-liquid-absorbing agent as recited in claim 1 include the absorption rate (FSR) of not less than 0.2 g/g/s, a water absorption capacity of 10 to 20 g/g, a saline flow conductivity of not less than 400×10^{-7} cm³·s/g, and a wet porosity of not less than 20%. The combination of each of these properties has been found to provide an aqueous-liquid-absorbing agent possessing excellent properties compared to the conventional fibrous pulp and the conventional water-absorbent resins. Frenz et al. does not disclose or suggest the combination of these features to one of ordinary skill in the art.

Each property recited in claim 1 provides a specific function and the combination together provides the desired properties. The aqueous-liquid-absorbing agent of the present invention has an absorption rate that is higher than conventional water-absorbent resin particles and does not swell as easily as conventional water-absorbent resin particles.

As noted in the Action, Frenz et al. does not disclose or suggest the claimed wet porosity of claim 1. The wet porosity within the claimed range is not inherent in the product of Frenz et al. simply because Frenz et al. discloses an absorbent composition. An absorbent composition obtained from similar monomers does not inherently produce the same absorbent composition. The Action provides no basis for the position that the absorbent composition of Frenz et al. inherently has a wet porosity within the claimed range.

The Action also provides no rational basis for the position that every composition obtained from the same monomer inherently exhibits the same properties. The process conditions for producing water-absorbent resin particles have a dramatic effect on the resulting properties. Therefore, merely because Frenz et al. discloses a similar monomer, does not inherently produce the same water-absorbent resin particles with the same properties. Accordingly, Applicants respectfully submit that the Action has provided no reasonable basis to suggest that the resulting particles of Frenz et al. inherently have a wet porosity within the claimed range.

The saline flow conductivity according to the claimed invention does not correspond to the saline flow conductivity disclosed in Frenz et al. Frenz et al. discloses a saline flow conductivity measured under different conditions than the present invention so that the saline flow conductivity does not corresponds to the claimed value. The saline flow conductivity according to the present invention is measured using a large amount of the aqueous-liquid-absorbing agent and thus obtains a large numerical value. The conditions for measuring the saline flow conductivity according to the present invention would result in an absorbent

composition having a numerical value of approximately 0 obtained according to Frenz et al. The saline flow conductivity of the present invention exhibits a higher saline flow conductivity value compared to the values disclosed in Frenz et al. Accordingly, Frenz et al. does not disclose or suggest a saline flow conductivity as in the claimed invention.

The values of the properties disclosed in Frenz et al. are not sufficiently close to render the claimed invention obvious to one of ordinary skill in the art. Frenz et al. specifically discloses a water absorption capacity significantly higher than the claimed range which clearly does not overlap with the claimed range. The Action provides no rational basis for the position that the high values disclosed in Frenz et al. are “sufficiently close” to the claimed range to render the claimed range obvious to one of ordinary skill in the art.

In view of the deficiencies of Frenz et al., claim 1 is not obvious over Frenz et al. Claims 2, 4 and 5 are also not obvious over Frenz et al. as depending from claim 1 and for reciting additional features of the invention. Frenz et al. does not suggest a particulate shape having not less than 90 wt% in the form of particles having particles diameters in the range of 150 to 600 μm as in claim 2, the water-absorbent particles being surface-crosslinked as in claim 4, or the aqueous-liquid-absorbing agent having a liquid-permeability-enhancing agent as in claim 5. Accordingly, claims 1, 2, 4 and 5 are not obvious over Frenz et al.

Rejection Over Frenz et al. in view of JP ‘527

Claim 3 is rejected under 35 U.S.C. § 103(a) as being obvious over Frenz et al. in view of JP ‘527. JP ‘527 is cited for disclosing agglomerated particles.

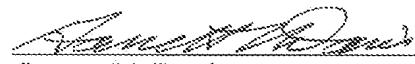
The Action asserts that “stacking up” particles on one another would make agglomerate particles. Applicants respectfully submit that this position is unsupported by the art of record. Simply stacking particles as they are produced does not inherently produce agglomerated particles as the term is normally understood in the art. As discussed above, JP

'527 does not disclose forming agglomerated particles. Moreover, the Action provides no rational basis or reasonable explanation to support the assertion that JP '527 inherently produces agglomerated particles. Agglomeration of particles requires more than mere stacking or contact of the particles during the production.

In view of the deficiencies of JP '527 and Frenz et al., it would not have been obvious to one of ordinary skill in the art to modify Frenz et al. to produce agglomerated particles as suggested in the Action. Accordingly, claim 3 is not obvious over the combination of Frenz et al. and JP '527.

In view of the above comments, the claims are submitted as being allowable over the art of record. Accordingly, reconsideration and allowance are requested.

Respectfully submitted,



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